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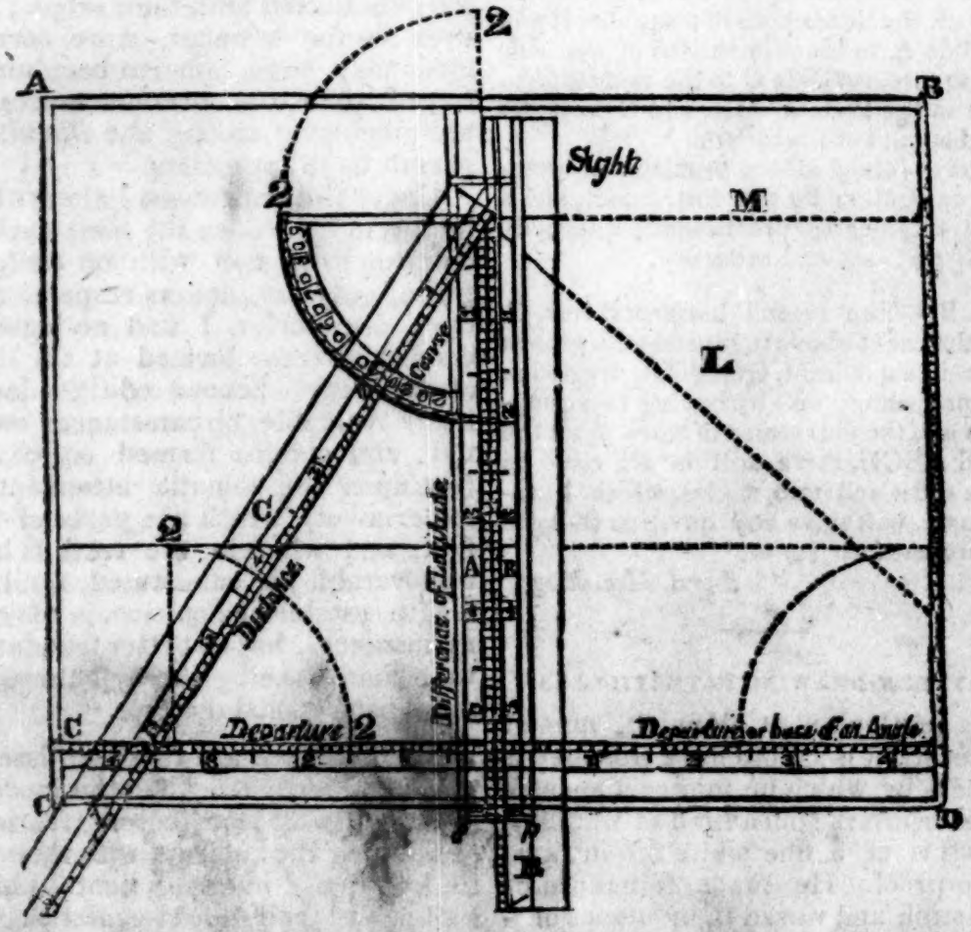
Then let each man observe with care
The wonders wrought by man's weak hand;
Nor let our scorn the worthless spare,
Who ne'er such wonders understand.
Of highest genius 'tis the pride
To comprehend what Art has done,
To know the law her steps that guide,
And share the glories she has won.
From the German of Schiller.

A QUADRANT, AND PRACTICAL NAVIGATOR.



SIR,—I hope you will be pleased to think this newly invented instrument worthy a place in your "Mechanics' Magazine." I presume, if it were completely made, it would be found very useful at sea for navigation, as any man might soon understand it; and also for many mechanics and schoolmasters, for demonstrating problems in the highest branches of the mathematics.

I am, sir, a friend and well wisher to mechanical sciences; and should this be thought worthy your notice, I shall be happpy to supply you with many of the latest inventions and improvements in this part of the country.

Your obedient servant,
HENRY OGLE,
Schoolmaster, at Rennington, near Alnwick, Northumberland.

Explanation of the Drawing.

ABCD represent a plain piece of board, with a place in the middle, *pp*, for the slide, A, to move up and down in.

Q is a quadrant made fast upon scale B. By enlarging this quadrant to a semicircle, QQ, the scales B and C, turning upon a centre, will set to solve all questions in oblique as well as plane trigonometry. B will turn off from scale A to any distance, as at L, the pricked line; and by sliding A upwards or downwards in the board, the scales will set to the given dimensions of any triangle whatever, and give both the plane and the true contents of all parts at the same time. By raising scale B to the pricked line, M, by a plummet hung at the centre, it becomes a good level; it will also give all the dimensions of a square. If you set slide A to the dimensions of one side of a square, set slide C to the same dimensions in the bottom scale, and C becomes the diagonal of the square.

I have solved all the problems of practical navigation by this instrument, and a great number of promiscuous questions, with great ease and accuracy.

N. B.—The second horizontal line, C, and that next above it, represents a groove wherein a quadrant, QQ, slides, divided as the preceding; and by having two quadrants and the four scales to move upon the board ABCD, there will in all cases be three slides and two angles, which, I presume, will solve any question that can be proposed.

Lond. Mec. Mag

PATTERN-DRAWING CATERPILLARS.

A gentleman at Munich, named Hebenstreit is said to have invented a process by which he makes a species of caterpillars spin a kind of wadding which is of a fine white colour, and waterproof. He made a balloon of this stuff, and raised it, by means of a chafing dish with spirits of wine in the large warehouse where he keeps his caterpillars at work. He makes them trace ciphers and figures in the waddding. He accomplishes this by moistening outlines of figures or letters with spirits of wine. The caterpillars avoid those tracings, and spin their web around them; thus any figure which has been drawn is represented in the stuff.

A piece of wadding, seven feet square, perfectly pure, and as brilliant as taffeta, was made by about fifty caterpillars, between the 5th and 26th of June. *ib.*

CUSTOMS CONSIDERED SUPERSTITIOUS ARE NOT ALWAYS SUCH.

SIR,—As nothing whatever can take place in the system but what is natural, the minutest and most familiar transaction is an object of scientific inquiry. It may likewise be asserted, that not only many of the customs of antiquity, which we are pleased to call superstitious, have rationality connected with their origin; but even in the sciences, more correct ideas may have hitherto been maintained than the present modes of philosophizing among the *illuminati* permit us to appreciate.

Under this impression I always feel happy to light upon the most ancient opinions to be met with on philosophical subjects, and as respects modern discoveries, I find no ideas so correct as those formed at the time of discovery. Second editions leave many valuable circumstances omitted; and opinion formed on opinion (not upon the minutiæ attendant on experiment, which are parts of the fact, and wherein the truth is best discoverable) is substituted, until, at length, established opinion, in too many instances, has no better foundation than that of being the hypothesis of some professional dictator.

In no instance are these sentiments more manifestly true than the modern practice, in all introductory treatises, of taunting the ancients with their little knowledge in experimental philosophy, and their idle speculations after first principles. The fact however is, that notwithstanding the high value set on experimental proof, without some better knowledge of the acting power of nature than what modern philosophy hypothetically maintains, we may go on for ages experimenting, without forming any thing like a system to correspond with nature It is general principles only, and not insulated cases, that can be said to agree with the system, where-

in a few species of elementary matter, and unity of means of action, alone exist.

But to the point—It is considered nothing less than the result of low, vulgar superstition, the custom of applying the hand of a man recently hung to a wen. Whence the practice originated, or how it was performed, even tradition does not say; but that it might have been, in some degree, efficacious, and would be still, if scientifically pursued, I think is nothing unreasonable to conceive.

A wen does not consist of such morbid matter as not to depend for its existence and growth on organization and on circulation; and when we reflect on the very great ingress or egress of the ethereal fluids of a human body suddenly deprived of life, and the possibility of a wen, brought in contact with the body, being acted similarly on, so as to promote circulation or destroy organization, there appears evidently more reason than superstition in the practice; at the same time, any other animal, under similar circumstances in all respects, would answer equally well. Failure of effect may probably arise from want of opportunity to make the application the instant vitality is subverted, and also from want of knowing that the parts brought in contact should have been previously made humid, or have a piece of linen between, moistened with some fluid, similar to that which promotes galvanic circulation.

Your obedient servant, T——.

ib.

A USEFUL PORTABLE CEMENT FOR FASTENING SHEETS OF PAPER TOGETHER.

Take 1 ounce of good isinglass (when the weather is not too hot nor damp) and put it into a small earthen ware pipkin, with a suitable quantity of boiling water, and let it remain on the fire-side for fourteen or fifteen hours, until it is quite dissolved, adding more water, if necessary, to get it to the consistency of cream; then pour it through a piece of fine linen, into a plate or dish, not leaving it more than three-eighths of an inch in thickness. When it is dry enough to cut, cut it into strips of about half an inch in width, and let it get pretty dry; then, with a needle and thread, string all the strips, and hang them up to get quite crisp and dry; in which state, if you slightly moisten, for a minute, in the mouth, one end of it, and place it between any two pieces of paper you want to unite, and move the strip of cement about for one or two seconds, until it is nearly dry; then draw the strip of cement from between the paper, and press or rub over the place with your nail, to effectually dry it, and in the course of two minutes afterwards, the paper will tear before the cement will yield. You can always carry a strip of this cement in your waistcoat pocket.

Your most obedient servant,

W. F.

Lond. Mec. Jour.

ANECDOTE OF GEORGE III RESPECTING THE MAGNET.

The following interesting anecdote, relative to the effect of magnetism on chronometers, has been communicated to a scientific journal:—

"When Harrison's time keeper was under trial at Richmond, it did not go as was expected. No one suspected the cause till his late Majesty George the Third, who interested himself much about the machine, suggested that it was affected by a magnet which was lying near it.—The magnet was removed, and the time keeper recovered its rate."

ib.

RAPID EVAPORATION.

Professor Œrsted fastens together a great number of fine metallic rods, or wire, and puts them in the bottom of the distillery or evaporating vessel, and by this means he distils seven measures of brandy with the same fuel, which, without the rods, would distil only four.

Lond. Mec. Mag.

ON MAKING TARRAS MORTAR FROM COMMON LIMESTONE.

Mr. Minard, a civil engineer in France, announced that all calcareous stones, when imperfectly calcined, would make tarras mortar.

Mr. Vicat mentioned in one of his memoirs, that when powdered chalk had been heated from six to thirty minutes on a red hot plate, it acquired the property of setting under water, provided it was mixed up stiff, like plaster of Paris.

But after this mixture had been kept under water for four months, its appearance was not altered, and it did not allow a knitting needle loaded with about six ounces to enter; yet an entry was easily made when the needle was pushed by the hand; whereas a specimen of tarras mortar that was made at the same time for the sake of comparison, perfectly resisted the entry of the needle, which bent by the force applied rather than enter.

In lime kilns the stones are not all equally calcined; and Mr Vicat found a large block of stone lime that exhibited the various stages in perfection:

1. The deep gray colour which every limestone takes when first it feels the fire.
2. A lighter gray.
3. A dirty white, with a slightly shining grain, like gypsum.
4. A dead white, of a close compact grain.
5. A dead white colour, with a soft chalk-like grain, which indicates complete calcination.

On the three first water has no action; in respect to the fourth, the slaking is slow, and it takes some hours to accomplish it; the fifth, when slaked in water, heats and falls to pieces rapidly.

The first three samples, which were as hard as the original stone, being reduced to powder, sifted, and mixed with water, produced a mortar that broke short in the hand; but, after remaining three months under water, it was easily penetrated by a knitting needle, and could scarcely be said to be set; some of these three mortars, left in lumps in the open air, being indeed hard and dry, but on being dipped in water, the first and second fell to pieces, and the third, which was more calcined than the others, kept its shape.

These experiments contradict the announcement of Mr. Minard, as to the formation of tarras mortar from the purer limestones; for this purpose they must contain a proportion of clay. The best of these limes, which, when slaked, increase in bulk from one to three parts in ten, and 100 measures of it take from 160 to 180 measures of sand, are those that form an excellent mortar to resist either the action of the weather or of running water.

Lond. Mec. Jour.

PAPER FOR THE PREVENTION OF FORGERIES IN BANK NOTES.

The object of this invention is to form certain tests of the genuineness in the paper on which bank notes are to be printed, which cannot be imitated after the paper is made, but must be given to the paper in the original formation at the paper mill; and at the same time to make these tests as simple as they can be, so that they may be immediately recognised and understood, and that all orders of people may be able to distinguish a bad note from a good one.

The first paper for this purpose is made to have the ordinary texture, smoothness, and thinness, united with a new and peculiar degree of strength, and a transparent water mark so bright that it cannot be imitated by friction, pressure, or varnish. The smoothness and thinness is to be given by rubbing the material to pieces instead of cutting it, and employing a material of a fine, long and flaky staple; and increasing the toughness by gum, isinglass, and glue made of parchment cuttings The water mark of this uncoloured paper is made more transparent than ordinary, by using very thin sheet copper or brass, instead of, or along with wire; and the transparency and distinction of the mark is improved by

dipping the paper in a vat of the thinnest possible material, twice for once couching it, and, by dipping the mould in clear water between the first and second dips of the pulp. But still the tests of the genuineness of this uncoloured paper are not of that decided character, nor so universally useful as those formed by the introduction of a coloured layer of pulp between two white layers

The material being prepared, and reduced to the finest possible pulp; one part of this is to be coloured with a mireral dye, or a coloured pulp may be made of a material previously dyed; the best of which is the Adrianople red cloth, the dye of which is not only clear and permanent, but also very difficult to give. The pulps being prepared, the paper may be made with two moulds, the first mould being plain, the second having a water mark, either of thin sheet copper or wire, or both.

There are several ways of forming the paper, first by three dips and three couchings A dip of white pulp is first taken in the plain mould and this is couched; a second dip with the water mark mould is then taken in the coloured pulp, and that couched on the white; and again, a third dip of the plain mould laid upon this. The paper thus produced contains, of course, a coloured layer, with a most brilliant, distinct, and indestructible water mark between two thin layers of white; now, it is obviously impossible to place the colour in the interior of the paper after the paper is made, without dyeing the external part also. And therefore the genuineness of this paper may be ascertained at once, merely by holding it up to the light.

If paper made by three dippings and three couchings be objected to on account of its being too thick, it may be made by three dippings and only two couchings, viz. by dipping first in the coloured pulp, then the white upon it in the water mark mould, then couching both these layers together, which brings the coloured layer uppermost; then dipping the second white separately in the plain mould, and couching it on the coloured layer.

This internally coloured paper may also be made by three dippings and only one couching; which is effected by dipping first in the white, then the colour, and then the white again, one upon another in the same mould, and couching the three layers at once. This mode, by requiring the greatest dexterity in the workman, and producing the thinnest paper, seems best calculated for security.

The security may also be somewhat strengthened, by leaving a margin of the interior coloured layer bare all round one of the faces of the note, which may be easily effected by taking a smaller deckle for the last couching.

The uncoloured paper first mentioned, may be improved by giving a faint tint to the two layers of colourless pulp; and although the colour would be superficial, yet it may be mottled, or laid on so as to produce a sort of shade to the transparent water mark; or two descriptions of water mark, one transparent and the other dark, might be used.

The paper might also be printed, when in an unfinished state, and the printing covered with an outer layer of very fine transpurent pulp, either plain or with a transparent water mark. There is also another manipulation, namely, printing upon the paper in an unfinished and damped state previous to its being sized; thus combining the operation of printing with the original making of the paper, and thus necessarily placing forgery still farther out of the reach of an individual. *ib.*

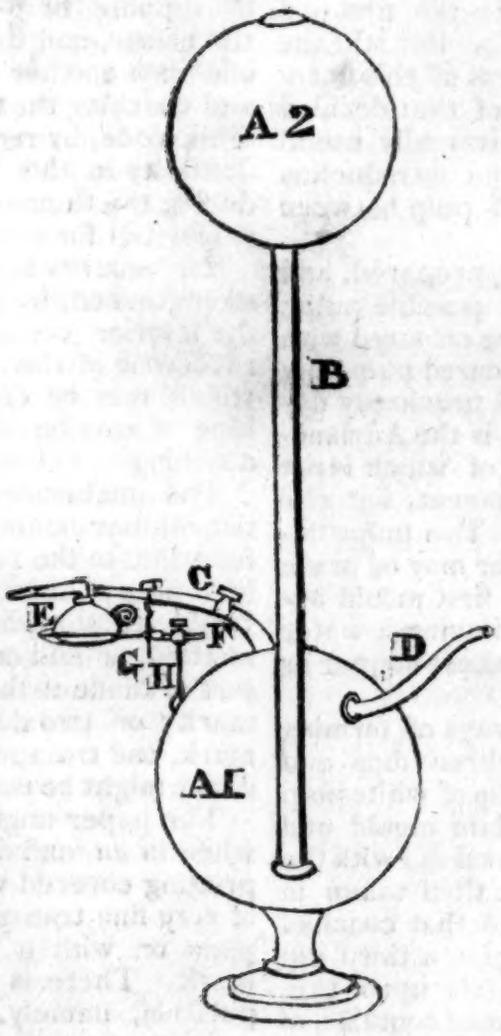
GEORAMA.

An establishment, under this title, has been erected in Paris, consisting of a hollow sphere forty feet in diameter, within which is laid out a general map of the world, executed by the best artists.

A spiral stair case ascends to three circular and insulated balconies, whence the spectators can view every part of the sphere, even in its most minute details.

Lond. Mec. Mag.

IMPROVED SIMPLE BLOWPIPE.



Description of the Drawing.

A 1, A2, are two boxes, or globes, made of tin or copper.

B, a pipe, of any size or length, reaching from the bottom of A2 to near the bottom of A 1.

C, the blast-pipe, with a stop-cock.

D, a mouth piece or nose of bellows, with a valve on the inner end, to prevent the escape of the air.

E, the lamp.

F, the slide.

G, the crutch, for the pipe to rest upon.

H, the stand, fixed to A 1, to support the lamp, &c.

I think an apparatus made on the above plan would be very powerful either for the bench, the forge, or the furnace; its power may be increased to any extent by lengthening the pipe B.

A 2 should be open at the top, and A 1 filled with water.

Hertford-street, May Fair,
April 9th, 1825. *ib.*

LORD BYRON'S OPINION OF MECHANICS' INSTITUTIONS.

The following remarks of Lord Byron, which we extract from a highly interesting work which has just made its appearance, entitled, "The Last Days of Lord Bryon," by Major Parry are strikingly corroborative of certain opinions which we have ourselves repeatedly expressed on the subject. His Lordship, indeed, would have gone farther than we were disposed; he would have confined the management of the Mechan-

ics' Institution to mechanics entirely, while we were willing that one-third of the managers should be selected from other classes. It must be confessed, however, that all the experience which we have yet had of this joint sort of management, is in favour of Lord Byron's opinion:—

"After my acquaintance with Lord Byron, he took a great interest in all that concerned the welfare of the working classes, and particularly of the artisan.—'I have lately read,' he said, on one occasion, 'of an institution recently established in London for the instruction of mechanics. I highly approve of this, and intend to subscribe 50 pounds to it; but I shall accompany the order for the money with a letter, giving my opinion on the subject. I am always apprehensive schemes of this description are intended to dupe people, and *unless all the offices in such an institution are filled with real practical mechanics, the working classes will soon find themselves deceived.* If they permit any but mechanics to have the direction of their affairs, they will only become the tools of others. The real working man will soon be ousted, and his more cunning pretended friends will take possession, and reap all the benefits. It gives me pleasure to think what a mass of natural intellect this will call into action; if the plan succeed, and I firmly hope it may, the ancient aristocracy of England will be secure for ages to come. The most useful and numerous body of people in the nation will then judge for themselves, and when properly informed, will judge correctly.'" *ib.*

SPENCE'S PERPETUAL MOTION.

SIR,—Your correspondent, Mr. T. Bell having expressed a wish to know the fate of John Spence, of Lintlithgow, or his invention, you will much oblige me by the insertion of the following account in your useful journal:—

About two years since, a person named Haigh (a native, I believe, of Yorkshire (called on me with what he called a "perpetual motion." I inquired why he did not present it to some learned body in London, instead of travelling with it as an exhibition? He replied, that as he was not himself the inventor, he was afraid he should not be attended to; he said it was invented by the late Mr. John Spence, of Linlithgow, near Edinburgh, who, being on his journey to London, to present it to the Royal Society, was taken ill in some part of Yorkshire, where, after a lingering illness, he died, and that he bequeathed the machine to him, in gratitude for the assistance he had received from him during his illness.

The construction of the machine was as pointed out by Mr. Bell, with this difference; the needle was attached to a brass balance, about the size and weight of the balance of a watch, beyond the edge of which it projected. He suffered me, after having witnessed its swift rotatory motion for about half an hour, to remove the balance, &c. from the frame in which it acted, when I found the pivots and holes very much worn, which convinced me it must have been in action a considerable time (he said it had, nearly six years.) On replacing it, and blowing slightly against the edge of the balance, it instantly commenced its action as before, *i. e.* with the same steady velocity, making about 160 revolutions in a minute, which I again witnessed a considerable time, nor did Haigh appear the least impatient to put an end to the gratification I was experiencing.

The following extract of a letter from Capt. Bagnold, R. M. Member of the Society of Arts, Haigh left with me:—

"Liverpool, May 2, 1820.

"Having inspected Mr. S. Haigh's exhibition of a magnetic perpetual motion, I prevailed upon him to permit the approach of a powerful horse shoe magnet, the property of Mr. Byewater, of this town. When in contact with the glass on one side, it produced no very striking alteration; when held perpendicularly over the case, it appeared rather to accelerate the revolution of the needle; but when removed to the opposite side, its effect

was instantly visible—the needle was suddenly checked, and seemed to recover its motion by successive impulses.

"From the foregoing circumstances I am clearly of opinion Mr Haigh's exhibition is a fair specimen of perpetual motion by magnetic influence, and the experiment has totally banished from my mind all suspicion of deception; and I strongly recommend Mr. Haigh by no means to repeat the experiment, lest injury should accrue to so ingenious an invention."

Fearing I have spun out my communication to an inconvenient length, I hasten to a conclusion, and remain,

Sir, your constant reader,

RICHARD PRICE,

Watchmaker and Silversmith.

Wiveliscombe, Somerset,

June 13, 1825, *ib.*

REV. EDWARD IRVING'S OPINION OF THE EDUCATION OF THE MECHANIC CLASSES.

"There is no subject at present so prominent to the public eye, or which engages so much the care of the religious world, as the education of the people. It hath prospered to a degree heretofore unexampled; insomuch that those who were formerly opposed to it are silent, or disposed to adopt that to which they once objected. Among the many inventions of this kind which have been patronised, there are especially two, schools for infants, and schools for mechanics, which have arisen as by enchantment, and spread themselves over the land. And, as the effect of these institutions, there have sprung up, like summer fruits, and been scattered, like autumns leaves, works for the infant mind, introductory to history, literature, and general knowledge; and periodical works have been multiplied a hundred-fold, and newspapers a thousand-fold, within the last century. All this testifies, with one voice, the capacity of man for knowledge, and shows to what extent that knowledge may be multiplied, fulfilling the prophecy of Daniel, 'Many shall run to and fro, and knowledge shall be increased.'

* * * *

"Now, as *letters* are the means of revealing knowledge to man, and as God has been pleased to employ them in making a revelation of his will to man, *reading* is the means to be employed to acquire this knowledge. Next, that a man may be able not only to profit from the past, but also profit those who are to come; that each man may record his own views and feelings, and communicate them where or to whom he pleases; there ought to be added the faculty of recording his own thoughts and observations, namely, that of writing.—These are *universals;* these ought to be taught every man; from these all may derive much guidance and consolation through life, and it seems to me that of this guidance and consolation the *poor* have the most need.—Their life is a scene of burden and incessant toil; they have much to depress them to the earth, and little to elevate them; they have no facility, like the rich, to move to and fro and behold the various works of Nature and of Art, and to make those discoveries which are calculated to lift up the head of man. I say the *poor*, who are bound to a given place; who have no history but a few traditions; who have no wisdom, but in a few proverbs; who have no hope for age, but an alms-house; these have the *best right*, by having the *greatest need*, to reading and writing, those wittiest helps of invention, by which the past and the future are made to appear before the eye; by which the learned are brought down to the lowest capacity; by which the good are introduced to the fireside; by which the godly are made on a level with their quality; by which all that is great is made as free and blessed to *the cottage* as it is to the palace or university. I would have it cried from the northern to the southern pole, from the rising to the setting sun, in language far less improperly accomodated than it is very frequently—'Ho, every one that thirsteth,

come ye to these waters; and he that hath no money, let him come and obtain these gifts of reading and writing without money and without price.'"

ib.

ON A WEAVING MACHINE.

In an old work, printed in the 17th century, it is said that the Italian abbot, Lancellotti, relates upon the evidence of a Mr. Muller, a Pole, who had seen the machine, that there was set up at Dantzic, an engine for weaving of four or five webs at a time, without any human help. It was an automaton, or apparently self-moving machine, which worked day and night, but what was its moving power, whether water or animals, is not said.

This invention was at that time suppressed, because it was thought to prejudice the poor people of the the town, and the inventor having suddenly disappeared, it was supposed that he was privately murdered, lest he should carry his art elsewhere, to the prejudice of Dantzic.

Lond. Mec. Jour.

OF CHINESE FIGURE STONE AS A PYROMETER.

The difficulty of procuring clay which contracts equably by heat, has long been considered as such an objection to the ingenious pyrometer, invented and used by the late Mr. Wedgewood, for the purpose of measuring the degree of heat in furnaces, as almost to cause the neglect of that ingenious contrivance.

It has lately been proposed to employ small bits of Chinese figure stone, called by mineralogists agalmatolite, instead of the bricks made of Cornish porcelain clay, used by Mr. Wedgewood; Mr. Sivright having found, upon experiment, that the Chinese figure stone is capable of standing a great heat, and of contracting its dimensions very considerable and equably.

ib.

PLASTER GROUND FOR MINIATURE PICTURES.

Miss Greenland's method of making tablets for black miniature profiles, is by mixing the finest powdered plaster of Paris with cold water, to the consistence of cream, and then pouring it on a flat or concave glass, according to the desire of the artist; then, when it is set, cut the plaster to the required size, and when quite hardened, take it off.

ib.

NATURAL GAS MANUFACTORY.

At the village of Fredonia, Chatauque County (N Y.) there are now two stores, two shops, and one mill that are every evening brilliantly lighted up with hydrogen gas, or inflammable air, which issues from a hole drilled into a rock composing the bed of a creek which passes through that village. No doubts are entertained that a sufficient quantity of this natural gas may be procured to light nearly or quite the whole village.

NEW STEAM ENGINE.

The Steam Boat BABCOCK, built by Capt. Northam, of Newport, and named after the ingenious mechanic by whose improved machinery she is propelled, made her first trip to Providence from Newport on Saturday last; notwithstanding the inflexibility of the machinery in its first operation, she performed the passage, 30 miles, in three hours and a half, during which time she consumed but one foot of fuel. The quantity of water required for generating the steam is less than a half pint at an injection, and we are informed that not more than a barrel was used in her passage.—The space occupied by the machinery is not much larger than it would require to accommodate a piece of furniture. The experiment in regard to Mr Babcock's important improvement may now be considered as fairly tested, and we congratulate him and

his enterprising patron, Capt. Northam, upon the complete success that has attended their undertaking.

The boat will hereafter constantly ply between the two parts.

SPLENDID PROJECTS.

The Grand Ship Canal Company is organized and going into operation in London, with the immense capital of four millions sterling ($17,777,777) Its object is to construct a canal through which ships of the line may pass from Portsmouth to London, without exposure to the delays and danger of the sea navigation around the Forelands, &c.

Another company, with a capital of 1,750,000 pounds, is incorporated for the construction of harbours and a ship canal, of 15 feet deep by 90 in width, and 44 miles long, from Seaton Bay, in the English Channel, to Bridgewater Bay, in the Bristol Channel; considered as a highly advantageous and beneficial work.

The Steam Navigation Company, for Atlantic and South American voyages, is also progressing They propose to send a boat from the Thames, to Halifax and New-York, once a fortnight, to perform the voyage with certainty, and within two thirds of the usual time. Packets will also sail regularly to the West Indies and South America. This is braving the violence of those elements from which the canal companies are providing the means of escape by retreating.

ON THE MANUFACTURE OF POTTERY.

(Continued.)

The average weight of an ale pint measure of the pulp of flint is 32oz. and of clay 24oz.

In some manufactories, the pulps are mixed together in a large vat, by a process similar to that first described, of mixing the clay with the water. But however the mixing be accomplished, great attention must be paid to the relative specific gravity of each fluid, and more of the solution of the flint or of the clay must be added, till a pint of the liquor weighs the determined number of ounces. It is by the weight and consistence of these materials, that the manufacturer is enabled to ascertain the proper proportions requisite for each kind of pottery; and it is from these that he can calculate whether there be a probability of making any improvement that will yield him a profitable return.

When the proper proportions of slop clay and flint have been well blunged, the liquor is pumped out of the reservoir on the top of the slip-kiln

The slip-kiln is a kind of trough formed of fire bricks, of various sizes, from 30 to 60 feet in length, by from 4 to 6 in breadth, and about 12 inches in depth. Flues from the fire-places pass under these troughs, and the bricks of which they are formed being bad conductors of heat, a slow and advantageous process of evaporation is carried on, which gives uniform consistence to the mass.

The porcelain clay is never allowed to boil, but is carefully evaporated at at a slow heat on a plaster kiln; the gypsum being run on old moulds pulverized, and thus forming a level surface.

The slip maker carefully attends to the evaporation, and at proper intervals turns over with a paddle the thickened mass from one end to the other, else the parts nearest to the bricks would become hard, while the surface continued fluid. To regulate the heat, three different thicknesses of bricks are employed; the thickest being placed nearest to the fire place, where is the greatest excess of heat.

When a sufficient quantity of the moisture is evaporated, which is indicated by apparent effervescence, or the absence of air bubbles on the surface of the mass, the composition, still called clay, is removed to the flags. If the evaporation were continued longer, the clay would not be formed into the required shapes, either on the wheel, or by the vat, but would be knotty or lumpy.

The clay is cut out of the kilns in

square masses, by means of spades, and is thrown into a heap, where is attained a uniform temperature of cold and moisture The longer it can lie after coming off the kiln the better it will be; but the time is arbitrarily varied by the want of room, of time, or of capital.

When the clay is first taken off the kiln it is, partly from the air bubbles remaining in it, and partly from the non-dissipation of the heat requisite for evaporation, too soft to be worked. On this account, it is well incorporated together, or tempered by beating with wooden mallets. It is then cut in small pieces with a paddle, and from the paddle each piece is, with all the force of the workman, propelled upon the mass These two operations are repeated until a proper consistence pervades the mass, and it is supposed to be well tempered.

When the clay is required for the thrower, the process of slapping follows next This is performed by a strong man, who places about half a hundred weight upon a strong bench, cuts the mass through with a thin brass wire, and taking up the piece thus cut off, he with his utmost strength casts it down again on the mass below; and continues the operation as long as is considered necessary.

This is a very laborious process, and is absolutely necessary, to drive out any air bubbles which may happen to remain in the mass after it has been beaten; for should any be left in the clay, the pieces, on being fired, would blister and spoil. On this very important account the process is continued until the mass, wherever cut by the brass wire, exhibits a surface perfectly smooth and homogenous

In several of the large manufactories, the slapping is superseded by mechanical contrivance. A quantity of the mass from the slip-kiln, when rather cold, is thrown into a large conical iron vessel, (similar to that employed in breaking the clay,) with strong knives fixed in it, with a given inclination, with corresponding knives radiating from a vertical shaft, moved by steam, or any other power, with a slow and regular motion. By these means, all the clay put into the cone is very minutely separated, and pressed down as by a screw, so that the mass first cut and divided is instantly squeezed together again, and is then similarly affected by other knives below. At the bottom of the cone on one side, is a quadrangular aperture, through which the clay is gradually forced, and is by a thin brass wire cut into brick-shaped pieces of from 50 to 60 pounds weight. Sometimes these masses, for particular purposes, are returned into the cone, and undergo the process a second time

Wedging the clay is a similar process, though never omitted by the presser or squeezer, however well it may have been beaten by the slip-maker. The presser cuts off, with a thin piece of brass wire, a piece of clay from the mass, which he slaps forcibly between the palms of his hands, and then with great violence throws it on the board; continuing the operation until the commixture is so complete that there is no probability of any air bubbles remaining. If one of the two first pieces of clay have been white and the other black or dark coloured, the mass, after undergoing these processes, would present, wherever cut, a uniform gray colour.

It is owing to the mass being properly wedged that that consistency and tenacity is obtained, which enables the workman to employ it with facility and confidence in the fabrication of the different pieces of pottery which he has to make. The clays for vessels require different degrees of wedging; and some kinds require much more careful and continued wedging than others.

The clay may now be considered ready for the throwing engine which consists of a large vertical wheel, having a winch affixed to its shaft, and a groove on the rim, for the introduction of a cord. The whole is fixed upon a strong moveable plank, by which the cord can be slackened or tightened at pleasure, and then upon

a frame nearly triangular or half oval, and about 30 inches in height, with a broad wooden hoop placed edgewise on the fore part, about six inches deep

In the centre of this frame is a vertical spindle, with its lower end fitted and worked in a step A little above this is a pulley, with grooves for three speeds of the propelling power, connected with the throwing wheel by means of a cord or belt; and a little higher up is a pivot, turned to fit and work in a collar step; on the upper end is a stout wooden circular top, which revolves horizontally, and is in diameter about 7 inches; and other tops of different diameters are in readiness to be fixed on, according to the intended size of the vessels to be made.

The engine is to be set in motion by manual labour, applied at the winch, and another man, called the baller, cuts with a thin piece of brass wire a piece of clay from the mass on the bench, and forms it into a ball, which he gives to the thrower. If china is to be made, the baller, previously to forming the clay into a ball, breaks it in two, and violently slaps it together between the palms of his hands. The thrower forcibly throws the ball down upon the horizontal revolving top of the engine; and, dipping his hands frequently into water, to prevent the clay adhering to them, fashions it into a long thin column, which he again forces down into a lump, and continues to repeat the operation until he is satisfied that the air bubbles, which might have remained in the clay after the process of slapping and balling have been performed, are dispelled.

The thrower now directs the speed of the engine to be lessened, and with his fingers, which he frequently dips in water, he gives the first form to the vessel; then, with different profiles or ribs, he forms the inside of the vessel into whatever shape may be required, and smooths it by removing the slurry, or inequalities.

If a number of vessels of the same size be required, the thrower has a peg placed as a guage, which serves to direct him in the width and depth; and when the vessel has two diameters, as the neck and body in a jug, he has two pegs to guide him.

The thrower forms all circular vessels in this manner; and he employs different sized ribs to finish the shapes, or swell of the edge, &c. When he has thus given the first form to the clay, he cuts the vessel from the head of the engine, by passing a thin brass wire through the lowest part of the clay, which separates it and allows it to be easily lifted off, and placed by the baller on a shelf, where it is left to dry a little preparatory to being turned, or properly smoothed and shaped.

When large vessels are made and the power of a steam engine applied, a pair of vertical cones is used, the apex of one being opposite to the vertex of the other. One of these cones is driven directly by the steam engine, and transmits motion to the other by means of a broad leathern band, which is always equally tight in every part of the cones, because they are equal and reversed; but it is plain, that the speed of the driven cone will vary much, according as the belt is at the top or bottom of the driving cone. When the belt is at the bottom of the thinnest part of the driving cone, the driven cone moves very slowly; as the band is made to ascend, the speed of the driven cone increases, and attains its maximum when the belt is at the top. A strap is attached from the driven cone to the spindle of the throwing engine, and the speed is varied at the thrower's pleasure by a boy working a directing winch When the article is finished, the machine is thrown out of geer.

For forming saucers, and other small circular articles, there has recently been introduced a small vertical shaft, called a jigger, on the top of which there is a turned head, suited to receive the mould on which the saucers, &c. are to be formed.

(*To be continued.*)

CANDLES WITH WOODEN WICKS.

There has been introduced a few years at Munich, in Bavaria, the use

of candles with wooden wicks. These candles yield a light equal to that of a taper, but burn with an equal and quiet flame; they do not crackle, and never run.

They endeavour to keep the manufacture secret, but there is no other difference between the making of these and the common candles, except in respect to the wick, which is made of wood surrounded by unspun cotton. Every kind of resinous wood is fit for the purpose, but that of the red fir is ereferred, and it is used as soon as possible after it is cut, that the essential oil which it contains may not have time to evaporate. The shoots of the present years are those which are used; they are first barked, then slightly scraped with a knife, to get rid of any inequalities, and dried for use. The shoots ought not to exceed the thickness of a straw. They are prepared by the country people, and brought into the city for sale.

The cotton is carded very fine, and passed between two rollers, which form it into a thin sheet. The splinter of wood is rolled on the cotton, so as to be entirely covered, and then dipped in wax to consolidate the cotton. The wicks thus prepared are placed in the mould, in the same manner as when cotton wicks are employed.—Great care is taken that no inequalities are suffered either in the wood or the cotton of these wicks.

It does not apper what peculiar advantages can attend this invention, for the manufacture of these wicks, must be equal to that of spun cotton.

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ON HANGING SLUICE DOORS AND FLOOD GATES.

Mr. Marriatt, of Liverpool, observes, that the usual methods of hanging doors intended to keep up water, are often very tedious and troublesome to open; whether they are opened as common doors, or made to rise and fall by machinery; hence, he considers the following method as in many instances preferable:—

A rectangular door, being fitted to the place, is to be hung, by placing across it strong gudgeons, which are to turn in holes made in the jambs, or in a wooden frame made for that purpose; or they may play in circular holes made in the stonework.

In order to determine the proper situation for these gudgeons, find the centre o pressure of the door, according to the depth to which the door is to be immersed in the water; and, drawing a line horizontally through this centre, place the axis of the gudgeons so that the door may turn upon the gudgeons in this line.

The door, thus hung, can be opened with the smallest force possible; it will also remain in any position in which it may be put, and consequently any quantity of water may be evacuated at pleasure. It may also be closed again with the greatest possible ease; for as the pressure of the water above and below the axis on which the door turns, is equal in every position of the door, any effort that is sufficient to overcome the friction of the several parts, is all that is required to open or shut the door.

In situations where the door is liable to be choked up with sand, much labour and expense is required to open them when hung in the common way; but if hung in this manner, the door may be easily rsised to a small height, and this being effected, the water will soon make its way, and carry the sand away with it.

As these doors must always remain across the sluice-way, this mode of hanging cannot be applied when large vessels have to pass in and out; but it will do for small craft; and in those situations where navigation is not practised, is superior to the common method.

When the upper part of the door is even with the surface of the water, the distance of the line of pressure, on which the door ought to revolve, is two-thirds the length of the door from the top. In every other situation, whether the top of the door be above or below the surface of the water, the centre of pressure coincides with the centre of oscillation, and is easily determined. *ib.*

ON THE FORCE EXERTED BY HORSES.

Mechanical writers differ greatly in regard to their estimate of the relative force exerted by men and horses, considered as moving powers.

The English writers, as Desaguliers and Smeaton, consider one horse only equal to five men;—whence we may suppose, that either our ordinary working horses are inferior in power, or our working men superior to those of the other nations.

The French writers, as Bossut, estimate one horse as equal to seven men; which, supposing the men to be but nearly equal to our own in power, ranks their horses as superior to the common ones in England; and agrees with the general observation of travellers, that the French horses are as strong and willing as they are ill-looking.

The same writer states the power of the ass as equal to that of two men.

The German writer, Schultze, considers a horse as equal in power to no less than fourteen men! a conclusion that could scarcely be expected, when the general large size of the Germans is taken into account.

The following are the observations relative to the power of the horse, as given by Desaguliers:—

A horse can draw, with a force of 200 lbs., two miles and a half in an hour;—and continue this action for eight hours every day. If the draught is 40lbs. he can continue it only for six hours every day.

A horse can draw up a steep hill more than three men can carry; that is to say, from 450 to 750lbs.

A strong horse can draw 2000lbs. up a steep but short hill.

A horse has sometimes carried 650 or 700lbs. for seven or eight hours without resting, but as his ordinary work.

A horse carried 11cwt. (or 1232lbs.) of iron for eight miles.

According to Mr. Smeaton, a horse, by means of pumps, can raise 250 hogsheads of water ten feet high in an hour.

A horse, loaded with 2cwt. can travel, on a good road, 25 miles in seven or eight hours.

Mr Fenwick estimates that a horse, moving at the rate of about two miles an hour, can, by means of a wheel and axle, raise a load of 1000lbs. with a velocity of 13 feet per minute, and continue this for twelve hours.

The same author says that a horse can exert a force of 75lbs., and continue it for nine hours and a half, moving at the rate of 13 feet in a minute.

According to Amontons, two horses with a plough exert a force of 150lbs.

Regnier says the mean draught of four horses was 36 myriogrammes (784lbs. avoir.) in 794 hours.

A mule works in the West Indies only two hours in eighteen; exerting a force of 150lbs. and moving three feet in a second, according to Cazan.

M. Hachette gives the following results of the power of horses, expressed in units of power, being the weight of a cubic metre of water raised to the height of a metre, 39 inches .37, or, which is the same, a kilogramme (2lbs. 3oz. 5dr. avoirdupois) raised a kilometre (3281 feet) equal to 7255lbs. avoirdupois, raised one foot:—

	Daily action.	Useful effect.
A cart horse	5600	——
A post horse	3420	——
A horse moving in a circle or working a pump	——	585
A horse moving in a circle and raising gypsum	1684	842
The mean of three horses working at a pump	1185	595
The mean of eight horses raising water by a pump	2948	675

Two horses drawing coals	—— . . .	1560
A horse drawing a load of 150,000 kilogrammes, eight kilometres	300	
The force of a horse acting 24 hours by estimate .	5974	

From these observations and experiments, Brewster estimates the mean force of a horse, according to different observers, to raise one foot in one minute.

Desaguliers - - - - - -	44,000lbs.
Smeaton - - - - - -	22,916
Hachette - - - - - -	28,000

The usual estimate of a horse power in steam engines is 33,000lbs.; and adding a third, or 11,000lbs. for friction, gives 44,000lbs. raised a foot per minute, for the real force to be overcome by the engine. *ib.*

EXTRACT OF MIMOSA BARK FOR THE USE OF TANNERS.

The extract of Mimosa bark is a new article that has been recently imported from New South Wales, by Mr. T. Kent.

It appears from the investigations that have taken place on this subject, by a committee of the Society for the Encouragement of the Arts. &c that the importation of hides from South America has of late years greatly increased, it being in this article that the South Americans mostly paid for the goods with which we furnished them. These hides, however, were not tanned in England, and exported again as leather, on account of the tanners not being able to procure a sufficiency of tanning materials.

Oak bark, from its bulk, is of very expensive carriage, and will not bear the expense of freight from distant foreign countries; but only from the near and opposite coasts of France and Flanders. As the oak bark grown in this country is only one-fifth of the demand, the remaining four-fifths used are those foreign barks, which of course are used by the tanners about the metropolis, as being the nearest points to those coasts.

The quality of leather is estimated partly by its colour; the paler it is the more esteemed A fact grounded upon the observation, that bark which has been kept too long, and been injured by fermentation, produces a brown leather, which is brittle, and of a bad quality.

Alder bark and larch bark make excellent leather, but being of a reddish bronw colour it is very difficult of sale.

Establishments have been lately formed in Dalmatia, and other distant ports, for making extract of oak bark, with a view of diminishing the expense of carriage, and enlarging the supply.

With the same view Mr. Kent made an extract from the bark of two species of mimosa growing as weeds in New South Wales and which are cut down for the purpose of clearing the land Of this extract he has brought home with him above two tons. On being tried by Mr. Brewin, of Bermondsey and other tanners, it has been found that the extract of mimosa will produce as much leather as between four and five times its weight of oak bark. Of course, it is not quite equal in strength to extract of oak bark; but in return, it may be imported at a cheaper rate.

Both extract of oak bark and of mimosa bark give too much colour to the leather; but as this dark colour does not appear to be attended with any other kind of inferiority, it is to be hoped that this prejudice against dark leather may in time be overcome. *ib.*

RUSSIAN MANNER OF PREPARING LEATHER.

At Murom, in Russia, they prepare leather by soaking fresh hides eight days

in pits or a river; if the hides are dry, they are taken out every day and worked upon the horse, in order to supple them: two parts of wood ashes are then mixed with one of quick lime, in a pit, and boiling water poured on them; the mixture is well stirred, more water added, and when the ley is clear, a grating is put on the ashes, and the skins placed on the grating. They are left in this pit for a week; or, if the hair does not come off easily, for a fortnight. The skins are then laid in pairs over poles in running water, to wash them; and afterwards properly pared on the flesh-side, and well trod, to supple them still more.

The skins are then laid in a pit for 24 hours, along with dog's dung and water; 100 calf-skins require about four pails of the dung, and larger skins in proportion; after which they are again rinsed. They are then soaked in a gruel made of oatmeal and rye-malt—the small skins for 24 hours, the larger skins longer; after which they are put into a tanning pit with bark liquor, for two or three days and nights. This is all considered as preparatory to the real tanning process.

The skins are placed on a grating in the tanning pits, upon powdered oak bark and with a layer of it between each skin; as also on the top; a mixture of water and ooze, or tanning liquor, half and half, is then pumped on them, and they are left in the pit for a week, or even longer: when taken out they are well rinsed and trod. This tanning is performed four times with fresh bark; the last time the skins remain in the pit for three weeks. They are then taken out, hung up in pairs to dry, and then delivered to the curriers.

For red leather, goats' skins or those of calves are used; and they are coloured with Brazil wood, which is called by the Russians red sandal; but Brazil wood must be the proper article as sanders does not colour water. A small skin takes half a pound, a large one a pound,—to the liquor for each 100 skins is added three pounds of alum. For black skins they use logwood, called by the Russians, tchernym sundalum, literally black sanders: the quantity used is the same as for red skins, but instead of alum three pounds of copperas, (green vitriol) is used. The skins are very closely sewed together in pairs, with the flesh side outwards; the dying liquor being poured into them, and the opening tied up, the skins are rolled about to distribute the colour as evenly as possible; they are then unsewed, and if they require to be coloured deeper, a second, or even a third colouring is giving them while flat, and they are merely rolled up.

When properly coloured, they are dressed on the flesh side with distilled oil of birch wood, the finest and clearest that can be procured; or, for common purposes, with whale oil. They are then grained, first lengthways, and then across, with wooden goffres, having their grooves very fine and close. After which they are finished on the horse with hemp oil and a rubber.

At Simbirsk, the Russians use, instead of common wood ashes, calcined ashes of elm wood, which forms a kind of cake of a greenish colonr; and instead of oak bark they use, for goat skins, the leaves of bears' breach, or uva ursi. the goats' skins thus prepared, being taken to Casan for sale are distinguished by the name of that city.

At Newjansk they only wash the leather with the colouring liquid, by which they save the trouble of making it into bags. Here they prefer willow bark, and use a cord and a half for ten hides.

DEVIL'S TREE.

There is a tree called the Devil's Tree; its fruit, in a state of maturity, is elastic, and when dried by the heat of the sun, noisily splits and bursts forth its grains.—To this sport of nature the tree owes its name, for at the moment of bursting, the effect of a piece of artillery is produced, the noise of which succeeds rapidly, and is heard tolerably far off.

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